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WINDROCK ANNOUNCES ON-SITE TRAINING CLASSES

Customer Demand and Economic Conditions Cause Windrock to Bring New Focus to its On-Site Training Services

By Mike Mercer

Knoxville, Tennessee, U.S.A.-based Windrock Inc. is a company that specializes in the design, manufacture and distribution of portable and online monitoring and diagnostic equipment, software, sensors and systems for reciprocating and rotating machinery. The company also provides customer support, technical service support, maintenance training services and analysis services.

For years, the company has been offering on-site training services for reciprocating and rotating machinery analysis, in addition to its regularly scheduled classes on analysis subjects held in Knoxville. But recently, thanks to customer demand and the company's desire to educate the industry, Windrock has refocused its attention to its on-site training, offering both Windrock and industry specific courses.

"We've been offering on-site training for many years, but haven't really marketed it as such, and we are doing that now," said David Drake,

vice president of sales and marketing at Windrock. "This is a new marketing direction for Windrock because in today's economic environment, it is easier for the customer to get training if we go to them. If they send 10 people for training, that's 10 plane tickets, 10 hotel rooms, and other expenses. If they bring us to them, the cost is dramatically less. We understand the economic conditions of our customers and want to offer them the opportunity to properly train their employees without breaking the bank to do so."

The company offers both Windrock specific courses, as well as industry specific courses such as Basic Engine/Compressor Analysis.

Windrock offers its Analyzer Hardware and Software Familiarization Course with the cost of the new analyzer. Other courses in Windrock's portfolio are offered for a fee.

Course length varies by topic. "We recommend for example, with our Windrock Analyzer Hardware and

Software Familiarization Course, that the class lasts four days," said Drake. "That is the amount of time that we feel it takes to adequately cover the material. Our Basic Engine/Compressor Analysis Course is five days and it's the full five days. There is so much information offered in that class that we couldn't do it in less time.

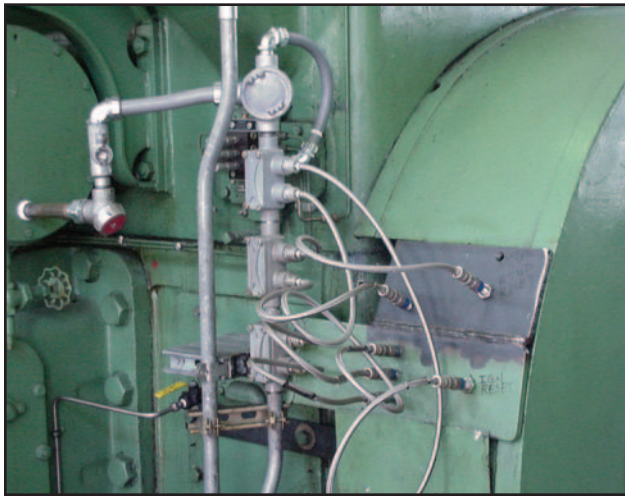
"On-site training is just one benefit offered by Windrock's Technical Services Department," added Drake. "All the technical assets of the company are available to help our customers with reciprocating machinery analysis. On-site training is just one way to help customers diagnose equipment malfunctions that reduce performance and cause equipment damage."

According to Drake, Windrock's Technical Services Department exists to help clients with all their reciprocating machinery analysis needs. The department staff uses its vast knowledge and data collected by the Windrock

6310/PA portable reciprocating machinery analyzers and customer's on-line monitoring systems to diagnose machinery malfunctions. In addition, they are able to provide contract engine and compressor performance testing, vibration analysis, pulsation measurements and load curve verification among other services.

Windrock's products are found in a variety of applications including, but not limited to, compressor stations for natural gas production and transmission, and refining operations. Its products are also used in cogeneration production facilities and in marine propulsion and mining applications.

The company's products can be separated into two groups, portable analyzers and online monitoring systems. The Windrock 6310 portable analyzer family of products includes the Model 6310/PA performance analyzer, the Model 6310/MA maintenance analyzer, the Model 6310/CA engine balancer and the Model 6310/VA vibration analyzer. All



■ With the HP-Guard systems, Dominion measures pressure and gas temperature on each cylinder end of each compressor. This data, combined with other data is used to calculate the horsepower and torque figures needed to keep the equipment operating at peak efficiency.

units in the family are portable, weigh 6.75 lbs. (3.06 kg) and measure 8.5 in. x 10.5 in. x 2 in. height x width x depth (21.59 cm x 26.67 cm x 5.08 cm). The heart of each unit is a Pentium grade processor, FIFO memory, large mass data storage, up to four dynamic input channels, plus separate input for speed and phase signal.

The online system products, called the On-Guard family of products, consist of permanently installed transducers and signal conditioning equipment to provide maintenance and operations personnel with continuous machinery diagnostics and protection. On-Guard products measure and calculate performance data and monitor the mechanical condition of reciprocating machinery, which is required to ensure safe and efficient equipment operation. The On-Guard family is made up of several modules for specific engine and compressor configurations allowing clients to customize individual systems.

Typical On-Guard output parameters include horsepower, flow balance, theoretical discharge temperature, calculated clearance, capacity, rod loading and reversal and vibration. The products offer the end user, OEM or packager the flexibility to design a monitoring system specifically for the application. This could range from basic machinery protection to complete condition and perform-

ance monitoring.

The system is designed to be modular and includes six unique data acquisition modules referred to as smart transmitters. Each is multichanneled and includes its own processor, memory and multi-drop address. The user can specify the appropriate number and type of transmitters required for the application's level of monitoring. Connections are made with RS-485 cable to the PLC or DCS system and/or to a Windrock System Monitor running the On-Guard reciprocating machinery diagnostic software.

One company using the Windrock equipment is Dominion Transmission. Dominion operates underground gas storage systems totaling nearly 900 Bcf (2.5 x 10¹⁰ m³) of capacity located in Ohio, West Virginia, Pennsylvania and New York, U.S.A.

The company currently has about 40 HP-Guard units installed — mostly in storage facility applications — with an additional 15 units planned for installation by the end of this year in storage and transmission applications. Windrock's HP-Guard is designed specifically to determine actual horsepower load, rod loading, percent of rod reversal and other performance calculations. All of the currently installed units are on slow speed reciprocating units (275 to 330 rpm) from Clark, Cooper, Dresser Rand and Ingersoll-

Rand with double acting reciprocating compressors.

These storage facilities are old depleted production fields that were in operation from the turn of the century up until the 1950s, when they were converted for storage.

"We focused on these sites first because with a wider range of operating conditions, our predictive horsepower curves were not accurate enough for optimal control," said Paul E. Harbert, II of Dominion Transmission. "We are beginning to put these systems in transmission service also, as we update controls on those units. These systems are part of our standard control panel designs for slow speed reciprocating engines. Most of these units have controls with fully automated sequencing and automatic pocket loading and torque control."

The wide range of fluctuation is part of the nature of a storage application. There is a wider range of suction and discharge pressures and that is what creates difficulty collecting accurate data. A transmission site does not have the wide pressure fluctuations of a storage site.

Dominion had done some horsepower mapping to develop horsepower curves back in the 1990s. However, the problem is that with such a wide range of seasonal application changes, the suction and discharge pressures varied greatly and the company just could not gather enough data to get accurate curves.

"We are using the Windrock HP Guard systems primarily for more precise torque control," said Paul Harbert. "On units without these systems, we control torque using either Hartwick or Beta calculated horsepower and torque. These calculated values are typically within +/- 5% of measured. Often, at certain compression ratios, we were more than 5% off. With the addition of the Windrock systems, we match our portable analyzer measured horsepower within 1 to 2%. This allows us to maximize the available horsepower without risking overloading the unit. In addition, we use

the dynamic rod load calculations to protect the units from excessive rod loading and non-reversing loads."

The Hartwick or Beta Calculated values are still used as a backup to the Windrock systems in the event of a hardware failure. If that were to occur, control would be switched to calculated horsepower without shutting the unit down.

"We are also using the horsepower data from this system to check that the unit is on its BSFC curve," continued Harbert. "The BSFC curves have been developed in-house. Running on the curve assures us that the unit is mechanically sound, and that it is more than likely meeting emissions requirements. With calculated horsepower, we did not have the required accuracy to track BSFC."

To get the data it needs, Dominion measures the pressure on each cylinder end of each compressor. We also measure TDC of the engine and we measure crank angle in degrees of rotation with magnetic pick-ups. The controller also tells it the temperature of the suction and discharge gas. These readings are taken at each degree.

When this information is calculated, the horsepower figure is reached using the temperature and pressure readings. According to Harbert, if they know the temperature, suction pressure and discharge pressure, they should be running at a specific horsepower level and the emissions levels should be at a specific point. If they are on the curve, then they are meeting emissions.

"We use the realtime HP number in this equation to compare to the curve," said Harbert. "As long as we are close to the curve, we are confident that the machine is in good mechanical condition. If we deviate from that, we know there is a problem somewhere. The first thing to do is go check and see if all of the equipment settings are where they need to be. If they are, then there is a problem somewhere that we need to address." ■